

## AMENDMENTS TO THE CLAIMS

Kindly replace the claims as follows.

1           1 (currently amended) A method, comprising the steps of:  
2           decoding a macroinstruction of a computer, the decoding of the macroinstruction  
3   generating a plurality ~~number~~ of iterations of a sequence of one or more microinstructions,  
4   including:  
5                 a pattern of microinstructions implementing a basic operation, and  
6                 a branch instruction predicted not taken;  
7           on detecting that an iteration completes operation of the macroinstruction, adding a  
8   marker indicating the end of the macroinstruction to a microinstruction in the pipeline  
9   downstream of the instruction decoder;  
10          after reaching a termination condition of the macroinstruction, partially executing an  
11   iteration beyond the termination, the partial execution committing at least one side-effect to  
12   an architecturally-visible resource of the computer, and raising an exception to transfer  
13   control to a second microinstruction stream; and  
14          in a second microinstruction stream, unwinding the side-effects committed by the  
15   post-termination iteration.

2. (cancelled)

3. (currently amended) The method of claim 5 ~~[[2]]~~,  
on detecting that an iteration completes operation of the macroinstruction, adding a  
marker indicating the end of the macroinstruction to a microinstruction in the pipeline  
downstream of the instruction decoder.

4. (currently amended) The method of claim 5 ~~[[2]]~~, further comprising the steps of:  
partially executing a loop iteration beyond the termination condition of a loop of a  
decoded microinstruction stream, the partial execution committing at least one side-effect to  
an architecturally-visible resource of the computer;  
raising an exception to transfer control to a second microinstruction stream;  
in the second microinstruction stream, unwinding the side-effects committed by the  
post-termination iteration.

1           5. (currently amended) A The method of claim 2 comprising the steps of:  
2           decoding a macroinstruction of a computer, the decoding of the macroinstruction  
3           generating a plurality of iterations of:  
4           a pattern of microinstructions implementing a basic operation, wherein the  
5           microinstruction set is architecturally exposed to programs fetched from an architecturally-  
6           visible memory of the computer, and  
7           a branch instruction predicted not taken.

6. (original) The method of claim 5, wherein instructions of the microinstruction set  
are managed by a memory management unit between a main memory of the computer and  
one or more cache levels.

7. (cancelled)

8. (currently amended) The computer of claim 11 ~~[[7]]~~, further comprising:  
instruction fetch and execution circuitry designed to fetch and execute instructions in  
both the macroinstruction set and the microinstruction set, each of the two instruction sets  
including store instructions to write data to a memory of the computer;  
store monitoring circuitry designed to monitor the store instructions and to invalidate  
any copies of a datum in memory overwritten by the store instructions, including copies of

instructions in any instruction cache in the instruction set other than the instruction set of the current store instruction.

9. (currently amended) The computer of claim 11 [[7]], further comprising:  
execution circuitry designed to execute an instruction calling for waiting to allow a pipeline to drain and to set bits of a floating-point control word to values denoted in an explicit immediate field of the instruction.

10. (cancelled)

1        11. (currently amended) A [[The]] computer of ~~claim 10, wherein~~, comprising:  
2        an instruction decoder designed to decode macroinstructions into microinstructions  
3        for execution in an instruction pipeline on a computer, and for at least one macroinstruction,  
4        the decoding of the macroinstruction generating a plurality number of iterations of:  
5                a pattern of microinstructions implementing a basic operation, and  
6                a branch microinstruction predicted not taken;  
7        the instruction decoder being further designed to cease generating iterations on the  
8        detection of ~~termination comprises detecting~~ a branch mispredict.

12. (original) The computer of claim 11 [[7]], wherein the branch microinstruction is a branch instruction available to a program fetched from a memory of the computer.

13. (original) The computer of claim 11 [[7]], wherein the branch microinstruction is generated carrying a marker indicating that the branch microinstruction defines a boundary between two successive iterations.

1           14. (currently amended) A method comprising the steps of:  
2           decoding a macroinstruction on a computer, the macroinstruction calling for a  
3 ~~plurality number~~ of iterations of a sequence of one or more microinstructions; and  
4           on detecting that an iteration completes operation of the macroinstruction, adding a  
5 marker indicating the end of the macroinstruction to a microinstruction in the pipeline  
6 downstream of the instruction decoder.

          15. (original) The method of claim 14, further comprising the steps of:  
          after reaching a termination condition of the iterations, partially executing an iteration  
beyond the termination, the partial execution committing at least one side-effect to an  
architecturally-visible resource of the computer, and raising an exception to transfer control  
to a second microinstruction stream;  
          in the second microinstruction stream, unwinding the side-effects committed by the  
post-termination iteration.

          16. (original) The method of claim 14, further comprising the steps of:  
          executing a microinstruction on the computer, the microinstruction storing into a  
memory location a value of a second instruction coded in the macroinstruction set;  
          in response to the storing, clearing a memory system, including an instruction cache,  
and execution pipeline of the computer of the former content of the memory location;  
          executing the second instruction in the execution pipeline.

          17. (original) The method of claim 14, wherein the detection of termination  
comprises detecting a branch mispredict.

          18. (currently amended) The method of claim 17, wherein the mispredict is detected  
on a branch microinstruction architecturally available to a program fetched from a memory  
of the computer method.

19. (original) The method of claim 14, wherein the branch microinstruction is generated carrying a marker indicating that the branch microinstruction defines a boundary between two successive iterations.

1           20. (currently amended) A computer, comprising:  
2           an instruction decoder designed to decode a macroinstruction set that includes a  
3           macroinstruction calling for a plurality ~~number~~ of iterations of a sequence of one or more  
4           microinstructions;  
5           a pipeline stage downstream of the instruction decoder designed to detect that  
6           operation of the macroinstruction is complete, and in response, to add to a microinstruction a  
7           marker indicating the end of the macroinstruction.

21. (currently amended) The computer of claim 20:  
wherein the decoder, when decoding the macroinstruction, is designed to generate a  
plurality ~~number~~ of iterations of:  
a pattern of microinstructions implementing a basic operation, and  
a branch microinstruction predicted not taken.

22. (original) The computer of claim 20,  
circuitry designed to execute an instruction calling for waiting to allow a pipeline to  
drain and to set bits of a floating-point control word to values denoted in an explicit  
immediate field of the instruction.

1           23. (original) A method, comprising the steps of:  
2           after reaching a termination condition of a loop of a first microinstruction stream  
3           executing in a computer, the microinstruction stream being generated by decoding a  
4           macroinstruction, partially executing a loop iteration beyond the termination, the partial

5 execution committing at least one side-effect to an architecturally-visible resource of the  
6 computer, and raising an exception to transfer control to a second microinstruction stream;  
7 in the second microinstruction stream, unwinding the side-effects committed by the  
8 post-termination iteration.

24. (original) The method of claim 23,  
executing a microinstruction of a computer, the microinstruction storing into a  
memory location a value of a second instruction coded in a second instruction set;  
in response to the storing, clearing an instruction cache and execution pipeline of the  
computer of the former content of the memory location;  
executing the second instruction in the execution pipeline.

25. (original) The method of claim 23, further comprising the step of:  
executing an instruction that calls for waiting to allow a pipeline to drain and setting  
bits of a floating-point control word to values denoted in an explicit immediate field of the  
instruction.

26. (original) The method of claim 23, further comprising the step of:  
ceasing to generate iterations when a termination condition of the macroinstruction is  
detected in an execution stage of an instruction pipeline of the computer.

27. (original) The method of claim 26, wherein the detection of termination  
comprises detecting a branch mispredict.

28. (original) The method of claim 23, wherein each iteration completes with a  
branch microinstruction architecturally available to a program fetched from a memory of the  
computer.

29. (original) The method of claim 28, wherein the branch microinstruction is generated carrying a marker indicating that the branch microinstruction defines a boundary between two successive iterations.

1           30. (original) A computer, comprising:  
2           circuitry designed to partially execute a post-termination iteration of a loop of a first  
3           microinstruction stream executing in the computer, the partial execution committing at least  
4           one side-effect to an architecturally-visible resource of the computer, and to raise an  
5           exception to transfer control to a second microinstruction stream;  
6           software of the second microinstruction stream, programmed to unwind side-effects  
7           committed by the post-termination iteration.

31. (currently amended) The computer of claim 30,  
an instruction decoder designed to decode macroinstructions into microinstructions for execution in an instruction pipeline on a computer, and for at least one macroinstruction, the decoding of the macroinstruction generating a plurality ~~number~~ of iterations of:  
a pattern of microinstructions implementing a basic operation, and  
a branch microinstruction predicted not taken.

32. (original) The computer of claim 30, further comprising:  
a pipeline stage downstream of an issue buffer of the computer, designed to detect the termination condition of the loop, and in response, to add to a microinstruction a marker indicating the end of the macroinstruction.

33. (original) The computer of claim 30, wherein the loop of the first microinstruction stream consists essentially of instructions generated by decoding a single macroinstruction fetched from memory of the computer.

34. (original) The computer of claim 30, wherein an instruction generator of the computer joins iterations of the loop by branches predicted not taken.

1           35. (original) A method comprising the steps of:  
2           in a computer having instruction fetch circuitry for fetching instructions in first and  
3           second instruction sets from a memory of the computer and executing the instructions,  
4           executing a first instruction coded in the first instruction set, the first instruction storing into a  
5           memory location a value of a second instruction coded in the second instruction set,  
6           in response to the storing, clearing an instruction cache and execution pipeline of the  
7           computer of the former content of the memory location;  
8           executing the second instruction in the execution pipeline.

36. (currently amended) The method of claim 35,  
decoding an instruction of the second instruction set, the decoding generating a  
plurality number of iterations of:

          a pattern of instructions of the first instruction set implementing a basic  
operation, and

          a branch instruction of the first instruction predicted not taken.

37. (original) The method of claim 35, further comprising the step of:  
executing an instruction calling for waiting to allow a floating-point pipeline of the  
computer to drain and to set bits of a floating-point control word to values denoted in an  
explicit immediate field of the instruction.

38. (original) The method of claim 35, an instruction decoder for the second  
instruction set designed to generate instructions in the first instruction set for execution in the  
execution pipeline.



39. (original) The method of claim 35, wherein the instructions in the execution pipeline are not tagged with an indication of an instruction set of origin.

40. (original) The method of claim 35, wherein the monitoring is based on comparing addresses in a physical address space.

1           41. (original) A computer, comprising:  
2           instruction fetch and execution circuitry designed to fetch and execute instructions in  
3           two different instruction sets, each instruction set including store instructions to write data to  
4           a memory of the computer;  
5           store monitoring circuitry designed to monitor the store instructions and to invalidate  
6           any copies of a datum overwritten by the store instructions, including copies of instructions  
7           in any instruction cache, in the instruction set other than the instruction set of the current  
8           store instruction.

42. (currently amended) The computer of claim 41,  
an instruction decoder designed to decode an instruction in a first of the instruction sets, and in response, to generate a ~~plurality number~~ of iterations of a sequence of one or more instructions in a second one of the instruction sets;

a pipeline stage downstream of the instruction decoder designed to detect that operation of the decoded instruction is complete, and in response, to add to a one of the generated instructions a marker indicating the end of the macroinstruction.

43. (original) The computer of claim 41:  
wherein the instruction fetch and execute circuitry is further designed to partially execute a post-termination iteration of a loop within a first instruction in a first one of the instruction sets, the partial execution committing at least one side-effect to an architecturally-visible resource of the computer, and to raise an exception to transfer control to a second

instruction stream in a second one of the instruction sets, programmed to unwind side-effects committed by the post-termination iteration.

- 1           44. (original) A method, comprising the steps of:  
2           decoding and executing an instruction on a computer, execution of the instruction  
3           comprising the steps of waiting to allow a pipeline to drain, and setting bits of a floating-  
4           point control word to values denoted in an explicit immediate field of the instruction.

45. (original) The method of claim 44, wherein instruction fetch and execution circuitry of the computer are designed to fetch and execute a macroinstruction set and a microinstruction set from memory.

46. (currently amended) The method of claim 45,  
decoding a macroinstruction of the computer, the decoding of the macroinstruction generating a plurality ~~number~~ of iterations of:  
a pattern of microinstructions implementing a basic operation, and  
a branch instruction predicted not taken.

47. (currently amended) The method of claim 45, further comprising the steps of:  
decoding a macroinstruction on the computer, the macroinstruction calling for a plurality ~~number~~ of iterations of a sequence of one or more microinstructions; and  
on detecting that an iteration completes operation of the macroinstruction, adding a marker indicating the end of the macroinstruction to a microinstruction in the pipeline downstream of the instruction decoder.

48. (original) The method of claim 45, further comprising the step of:  
emitting the instruction as a microinstruction in response to a macroinstruction whose execution is dependent on a full/empty state of a floating-point top-of-stack.

1           49. (original) A computer, comprising:  
2           execution circuitry designed to execute an instruction calling for waiting to allow a  
3           pipeline to drain and to set bits of a floating-point control word to values denoted in an  
4           explicit immediate field of the instruction.

50. (original) The computer of claim 49, wherein instruction fetch and execution circuitry of the computer are designed to fetch and execute instructions in two different instruction sets.

51. (original) The computer of claim 49, further comprising:  
each instruction set including store instructions to write data to a memory of the computer  
store monitoring circuitry designed to monitor the store instructions and to invalidate any  
copies of a datum in memory overwritten by the store instructions, including copies of  
instructions in the instruction set other than the instruction set of the current store instruction.

52. (original) The computer of claim 49, the instruction specifying individual bits of the floating-point control word to be written, in addition to values to be written to those bits.

53. (original) The computer of claim 49,  
the execution circuitry being further designed to execute an instruction calling for waiting  
to allow a pipeline to drain and to raise an exception based on a test of bits of a floating-point  
control word.

54. (new) The method of claim 5, wherein the branch microinstruction is generated  
carrying a marker indicating that the branch microinstruction defines a boundary between two  
successive iterations.